Glycolytic Metabolism Plays a Functional Role in Regulating Human Pluripotent Stem Cell State.

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Public Summary:
The rate of glycolytic metabolism changes during differentiation of human embryonic stem cells (hESCs) and reprogramming of somatic cells to pluripotency. However, the functional contribution of glycolytic metabolism to the pluripotent state is unclear. Here we show that naive hESCs exhibit increased glycolytic flux, MYC transcriptional activity, and nuclear N-MYC localization relative to primed hESCs. This status is consistent with the inner cell mass of human blastocysts, where MYC transcriptional activity is higher than in primed hESCs and nuclear N-MYC levels are elevated. Reduction of glycolysis decreases self-renewal of naive hESCs and feeder-free primed hESCs, but not primed hESCs grown in feeder-supported conditions. Reduction of glycolysis in feeder-free primed hESCs also enhances neural specification. These findings reveal associations between glycolytic metabolism and human naive pluripotency and differences in the metabolism of feeder-/feeder-free cultured hESCs. They may also suggest methods for regulating self-renewal and initial cell fate specification of hESCs.

Scientific Abstract:
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